In [9]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import json
```

In [10]:
```
#read and load the data set
df = pd.read_excel('InterviewTask.xlsx')
df.head()
```

Out[10]:

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	DECODE TYP
0	2020-10-01 02:25:19	NaN	NaN	8165573041	NaN	NaN	NaN	Na
1	2020-10-01 02:27:12	MR KINGSLEY	MALE	8069454349	MARARABA	NaN	NASARAWA	DIGITA TERRESTIA TRANSMISSIO (DT
2	2020-10-01 02:28:06	NaN	NaN	8166024443	NaN	NaN	NaN	Na
3	2020-10-01 02:30:10	MR NDUBUSI	MALE	7051888653	PORT HARCOURT	RIVERS	RIVERS	Na
4	2020-10-01 02:31:49	MR SUNDAY	MALE	7083502865	NaN	NaN	NaN	DIGITA TERRESTIA TRANSMISSIO (DT

In [11]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 28025 entries, 0 to 28024
Data columns (total 14 columns):
ENTRY DATE            28025 non-null datetime64[ns]
NAMES                 26619 non-null object
GENDER                26743 non-null object
MOBILE NUMBER         28025 non-null object
CUSTOMER ADDRESS      25352 non-null object
DSO REGION            24918 non-null object
STATE                 25312 non-null object
DECODER TYPE          19916 non-null object
ANTENNAE TYPE         20397 non-null object
BRAND OF BOX          19345 non-null object
CALL CATEGORY         28025 non-null object
COMPLAINT CATEGORY    18855 non-null object
AGENT NOTES           27995 non-null object
RESOLUTION STATUS     28025 non-null object
dtypes: datetime64[ns](1), object(13)
memory usage: 3.0+ MB
```

In [12]:
```
df1 = df[df['CALL CATEGORY'] != 'Call Terminated']
df1
```

Out[12]:

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	
1	2020-10-01 02:27:12	MR KINGSLEY	MALE	8069454349	MARARABA	NaN	NASARAWA	T
3	2020-10-01 02:30:10	MR NDUBUSI	MALE	7051888653	PORT HARCOURT	RIVERS	RIVERS	
4	2020-10-01 02:31:49	MR SUNDAY	MALE	7083502865	NaN	NaN	NaN	T
5	2020-10-01 02:34:38	MR DAVID	MALE	8166024443	JOS SOUTH	PLATEAU	PLATEAU	T
6	2020-10-01 02:37:12	MR WILLIAMS	MALE	8086636304	KADUNA CENTRAL	NaN	NaN	T
7	2020-10-01 02:38:53	MR CHIDEX	MALE	9015054641	GWAGWALADA	FCT	FCT	T
8	2020-10-01 02:41:05	MR TIMOTHY	MALE	7037177817	JOS NORTH	PLATEAU	PLATEAU	T
9	2020-10-01 02:43:14	MR CHIDEX	MALE	9015054641	GWAGWALADA	FCT	FCT	T
10	2020-10-01 02:45:03	MR CHIDEX	MALE	9015054641	GWAGWALADA	NaN	FCT	T
11	2020-10-01 02:47:15	MR UMAR	MALE	8075576061	KADUNA SOUTH	NaN	KADUNA	T
12	2020-10-01 02:50:29	MR JOE	MALE	8069279772	MANDALA	NaN	NIGER	T

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	
14	2020-10-01 02:53:36	MR HANSON	MALE	8133879582	AIRPORT RD	FCT	FCT	T
15	2020-10-01 02:59:10	MR ABDULAHI	MALE	8139610014	JOS NORTH	PLATEAU	PLATEAU	T
16	2020-10-01 03:01:10	MR JEFFERY	MALE	7036899138	JOS NORTH	PLATEAU	PLATEAU	T
18	2020-10-01 03:11:20	MR ETAL	MALE	8065666431	BWARI	FCT	FCT	T
19	2020-10-01 03:14:08	MR BEN	MALE	8164944093	JOS NORTH	NaN	PLATEAU	T
20	2020-10-01 03:19:32	MR CHIBUZOR	MALE	7041692368	LUGBE	FCT	FCT	T
24	2020-10-01 03:24:27	MR DAUDA	MALE	8026064794	ASOKORO	FCT	FCT	T
25	2020-10-01 03:28:35	MR CHARLEY	MALE	8033509169	LIFE CAMP	FCT	FCT	T
26	2020-10-01 03:29:10	MR ISAAC	MALE	8065666431	apo	FCT	FCT	
27	2020-10-01 03:32:38	MR IBASS	MALE	8065666431	BWARI	FCT	FCT	T
28	2020-10-01 03:34:47	MR VINCENT	MALE	8032050204	APO	FCT	FCT	
29	2020-10-01 03:35:45	MR MOSES	MALE	7033804197	KADO	FCT	FCT	T

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	
30	2020-10-01 03:39:44	MR DAVID	MALE	7087816733	ZUBA	FCT	FCT	T
32	2020-10-01 03:43:54	MR YAKUBU	MALE	8061271810	BURI	FCT	FCT	
33	2020-10-01 03:45:00	MR MOSES	MALE	7033804197	LIFE CAMP	FCT	FCT	T
34	2020-10-01 03:47:41	MR GEBRIEL	MALE	8031949346	APO	FCT	FCT	
35	2020-10-01 03:49:42	MR MONDAY	MALE	8165213216	JOS SOUTH	PLATEAU	PLATEAU	T
36	2020-10-01 03:53:15	MR GABRIEL	MALE	8031949346	MARARABA	NASARAWA	NASARAWA	T
37	2020-10-01 03:55:29	MR CHIBUZOR	MALE	9096239417	APO	FCT	FCT	
...	...	...	...	...	...	...	...	
27991	2020-06-29 10:22:08	MR MUSA	MALE	8039200607	KADUNA SOUTH	KADUNA	KADUNA	T
27992	2020-06-29 10:22:28	EMMANUEL	MALE	8131378758	KABA	KOGI	KOGI	
27993	2020-06-29 10:25:01	MOHHAMED	MALE	8068462616	ILLORIN	KWARA	KWARA	T
27994	2020-06-29 10:26:12	MRS KATE	MALE	8036949790	GWAGWALADA	FCT	FCT	T
27995	2020-06-29 10:27:25	MR EMMANUEL	MALE	9091186600	KADUNA NORTH	KADUNA	KADUNA	

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	
27997	2020-06-29 10:41:37	MR STEPHEN	MALE	7032363766	LUGBE	FCT	FCT	T
27999	2020-06-29 10:45:04	MR EMEKA	MALE	7065751719	JOS NORTH	PLATEAU	PLATEAU	T
28001	2020-06-29 10:49:09	wasiu	MALE	7062504343	OSHOGBO	OSUN	OSUN	T
28002	2020-06-29 10:49:25	MR JOHN	MALE	8127201839	JOS NORTH	PLATEAU	PLATEAU	
28003	2020-06-29 10:51:40	TIMOTHY	MALE	9060769380	GWAGWA	FCT	FCT	
28004	2020-06-29 10:56:24	MR EMEKA	MALE	7065751719	APO	FCT	FCT	
28005	2020-06-29 10:56:55	TOLUWOLE	MALE	8128785788	DURUMI	FCT	FCT	T
28007	2020-06-29 11:08:14	MR SAMUEL	MALE	8052240882	GARKI 2	FCT	FCT	T
28008	2020-06-29 11:11:11	MR PRINCE	MALE	7040292926	JOS SOUTH	PLATEAU	PLATEAU	T
28009	2020-06-29 11:13:23	daniel	MALE	8061567138	GWAGWALADA	FCT	FCT	T
28010	2020-06-29 11:13:56	MR CHRISTAIN	MALE	9092007848	GWAGWALADA	FCT	FCT	T
28011	2020-06-29 11:18:18	STEVEN	MALE	8052240882	GARKI	FCT	FCT	T
28012	2020-06-29 11:23:18	MR AYUBA	MALE	8145209814	JOS SOUTH	PLATEAU	PLATEAU	T

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	
28013	2020-06-29 11:25:00	PETER	MALE	8130783105	JOS NORTH	PLATEAU	PLATEAU	T
28014	2020-06-29 11:27:06	MR EMMANUEL	MALE	8037006900	LOKOGOMA	FCT	FCT	T
28015	2020-06-29 11:29:53	MR NKEM	MALE	8076218135	GWAGWALADA	FCT	FCT	T
28016	2020-06-29 11:32:46	MR EMMANUEL	MALE	8168472096	BWARI	FCT	FCT	T
28017	2020-06-29 11:36:41	MRS CHIYERE	FEMALE	9062135433	AIRPORT ROAD	FCT	FCT	T
28018	2020-06-29 12:09:46	MR JEFFERY	MALE	8104058782	JOS NORTH	PLATEAU	PLATEAU	
28019	2020-06-29 12:10:06	john	MALE	8127201839	KADUNA SOUTH	KADUNA	KADUNA	T
28020	2020-06-29 12:25:11	ADERONKE	FEMALE	7065592576	LUGBE	FCT	FCT	T
28021	2020-06-29 12:56:43	ADERONKE	FEMALE	7065592576	LUGBE	FCT	FCT	T
28022	2020-06-29 13:10:21	MR JAMES	MALE	7039050409	JOS NORTH	PLATEAU	PLATEAU	
28023	2020-06-29 13:13:36	MR JOSHUA	MALE	8065094499	AIRPORT	FCT	FCT	
28024	2020-06-29 13:17:07	MR JOHN	MALE	8033176714	APO	FCT	FCT	

23382 rows × 14 columns

In [13]:
```
df1.info()
```

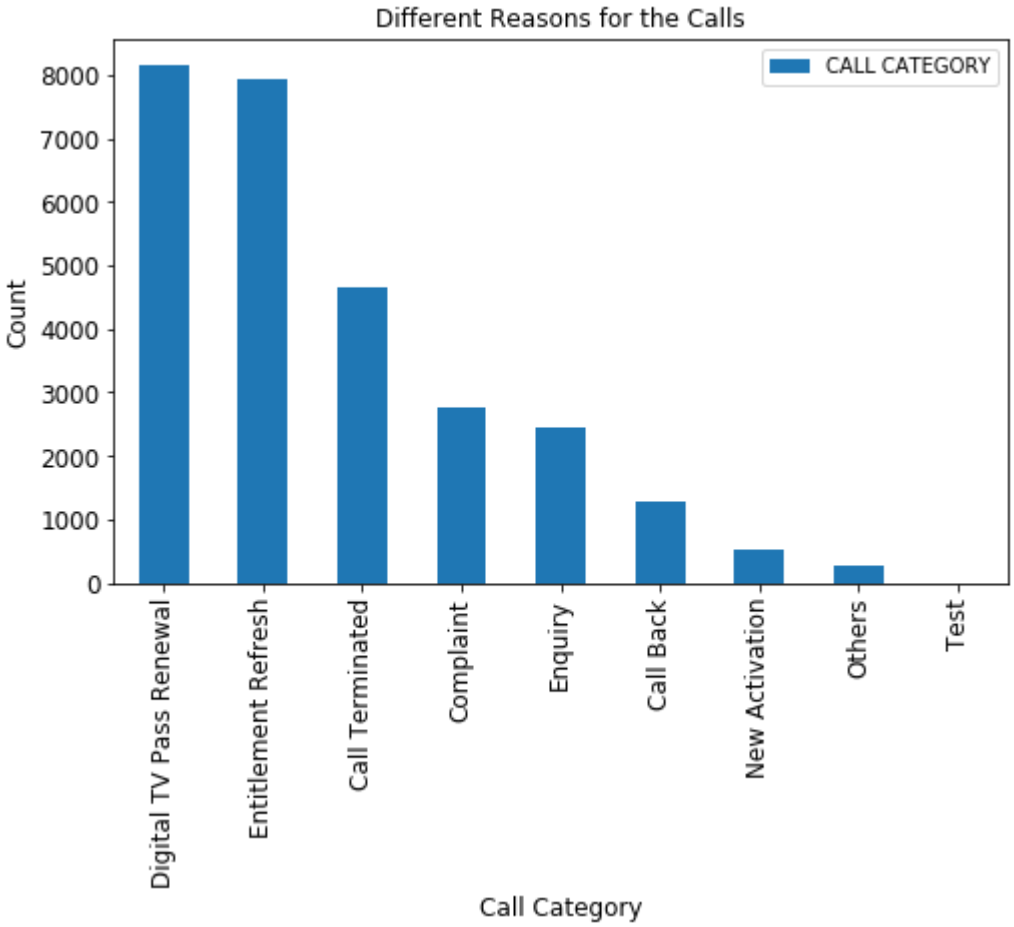
```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 23382 entries, 1 to 28024
Data columns (total 14 columns):
ENTRY DATE            23382 non-null datetime64[ns]
NAMES                 23294 non-null object
GENDER                23148 non-null object
MOBILE NUMBER         23382 non-null object
CUSTOMER ADDRESS      23001 non-null object
DSO REGION            22582 non-null object
STATE                 22962 non-null object
DECODER TYPE          18558 non-null object
ANTENNAE TYPE         19551 non-null object
BRAND OF BOX          18920 non-null object
CALL CATEGORY         23382 non-null object
COMPLAINT CATEGORY    18854 non-null object
AGENT NOTES           23360 non-null object
RESOLUTION STATUS     23382 non-null object
dtypes: datetime64[ns](1), object(13)
memory usage: 2.7+ MB
```

In [14]:
```
%matplotlib inline
from matplotlib import pyplot as plt

call_category = df['CALL CATEGORY'].value_counts()
call_category
```

Out[14]:
```
Digital TV Pass Renewal    8164
Entitlement Refresh        7940
Call Terminated            4643
Complaint                  2752
Enquiry                    2447
Call Back                  1285
New Activation              523
Others                      270
Test                          1
Name: CALL CATEGORY, dtype: int64
```

In [15]:
```
ax = call_category.plot(kind='bar', title ="Different Reasons for the Calls",
figsize=(8, 5), legend=True, fontsize=12)
ax.set_xlabel("Call Category", fontsize=12)
ax.set_ylabel("Count", fontsize=12)
plt.show()
```



In [16]:
```
df2 = df1[df1['CALL CATEGORY'] =='Complaint']
df2.head()
```

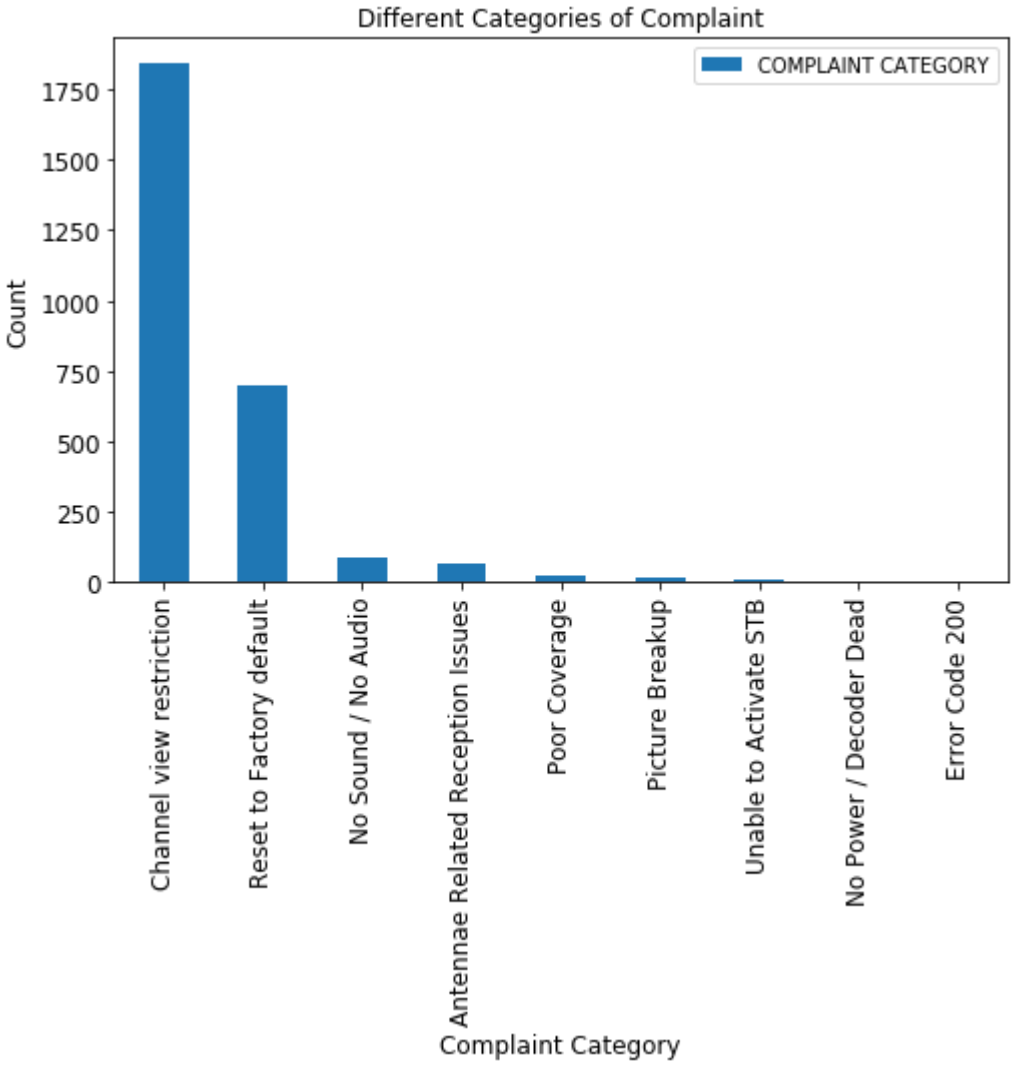
Out[16]:

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	DEC
15	2020-10-01 02:59:10	MR ABDULAHI	MALE	8139610014	JOS NORTH	PLATEAU	PLATEAU	DI TERRE TRANSMIS
33	2020-10-01 03:45:00	MR MOSES	MALE	7033804197	LIFE CAMP	FCT	FCT	DI TERRE TRANSMIS
148	2020-10-01 08:46:52	MR WILLIAMS	MALE	8086636304	KADUNA	KADUNA	KADUNA	DI TERRE TRANSMIS
246	2020-10-02 05:36:02	MR ISA	MALE	8036252319	GWAGWALADA	FCT	FCT	DI TERRE TRANSMIS
273	2020-10-02 07:04:14	MR MONDAY	MALE	9017774277	AFIKPO SOUTH	EBONYI	EBONYI	DIRE HOME

In [17]:
```
complaint = df2['COMPLAINT CATEGORY'].value_counts()
complaint
```

Out[17]:
```
Channel view restriction             1843
Reset to Factory default              698
No Sound / No Audio                    88
Antennae Related Reception Issues      67
Poor Coverage                          24
Picture Breakup                        16
Unable to Activate STB                 11
No Power / Decoder Dead                 3
Error Code 200                          1
Name: COMPLAINT CATEGORY, dtype: int64
```

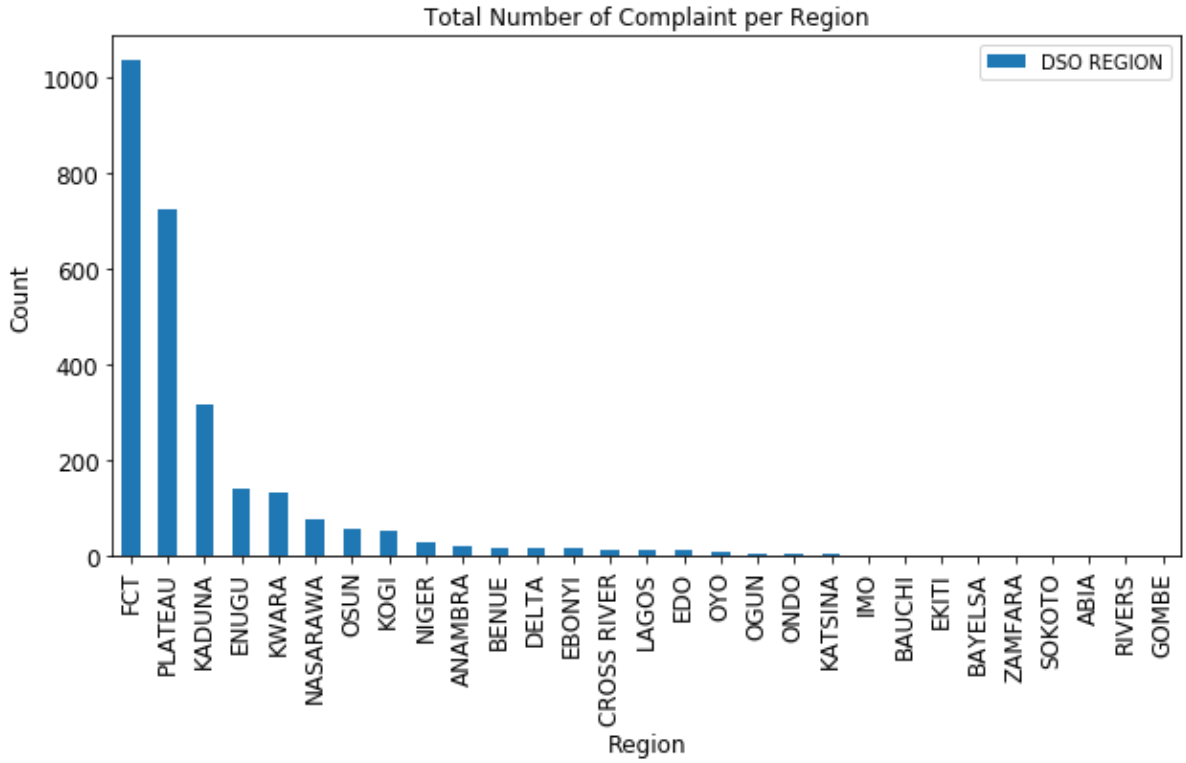
In [18]:
```
ax = complaint.plot(kind='bar', title ="Different Categories of Complaint", fi
gsize=(8, 5), legend=True, fontsize=12)
ax.set_xlabel("Complaint Category", fontsize=12)
ax.set_ylabel("Count", fontsize=12)
plt.show()
```



In [19]:
```
region = df2['DSO REGION'].value_counts()
region
```

Out[19]:
```
FCT            1034
PLATEAU         722
KADUNA          317
ENUGU           140
KWARA           133
NASARAWA         78
OSUN             55
KOGI             51
NIGER            30
ANAMBRA          19
BENUE            18
DELTA            17
EBONYI           16
CROSS RIVER      13
LAGOS            12
EDO              12
OYO               8
OGUN              3
ONDO              3
KATSINA           3
IMO               2
BAUCHI            2
EKITI             1
BAYELSA           1
ZAMFARA           1
SOKOTO            1
ABIA              1
RIVERS            1
GOMBE             1
Name: DSO REGION, dtype: int64
```

In [20]:
```
ax = region.plot(kind='bar', title ="Total Number of Complaint per Region", fi
gsize=(10, 5), legend=True, fontsize=12)
ax.set_xlabel("Region", fontsize=12)
ax.set_ylabel("Count", fontsize=12)
plt.show()
```



In [21]:
```
decoder_type = df2['DECODER TYPE'].value_counts()
decoder_type
```

Out[21]:
```
DIGITAL TERRESTIAL TRANSMISSION (DTT)    2386
DIRECT TO HOME (DTH)                      250
Name: DECODER TYPE, dtype: int64
```

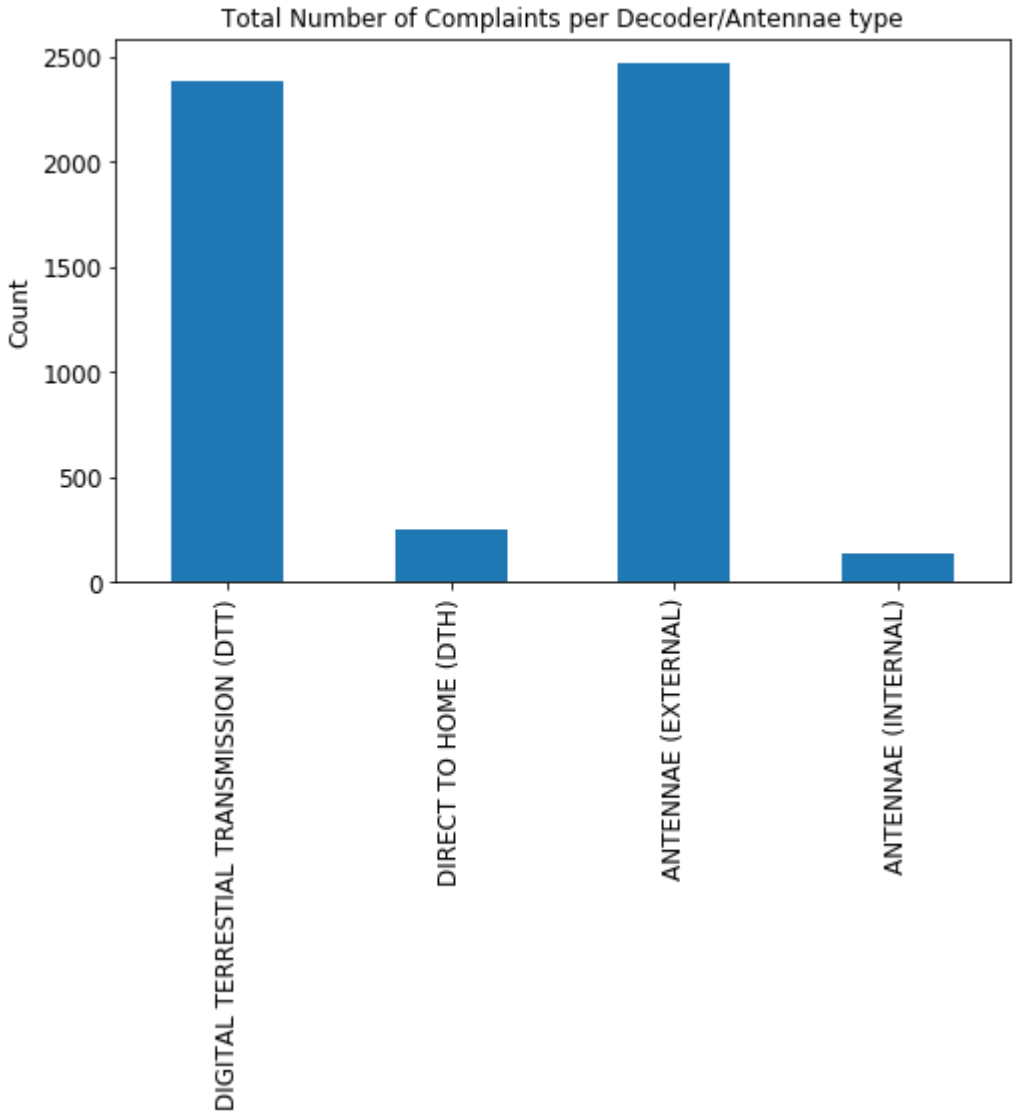
In [22]:
```
antennae_type = df2['ANTENNAE TYPE'].value_counts()
antennae_type
```

Out[22]:
```
ANTENNAE (EXTERNAL)    2465
ANTENNAE (INTERNAL)     133
Name: ANTENNAE TYPE, dtype: int64
```

In [23]:
```
df3 = pd.concat([decoder_type, antennae_type], axis=0, ignore_index=False)
df3
```

Out[23]:
```
DIGITAL TERRESTIAL TRANSMISSION (DTT)    2386
DIRECT TO HOME (DTH)                      250
ANTENNAE (EXTERNAL)                      2465
ANTENNAE (INTERNAL)                       133
dtype: int64
```

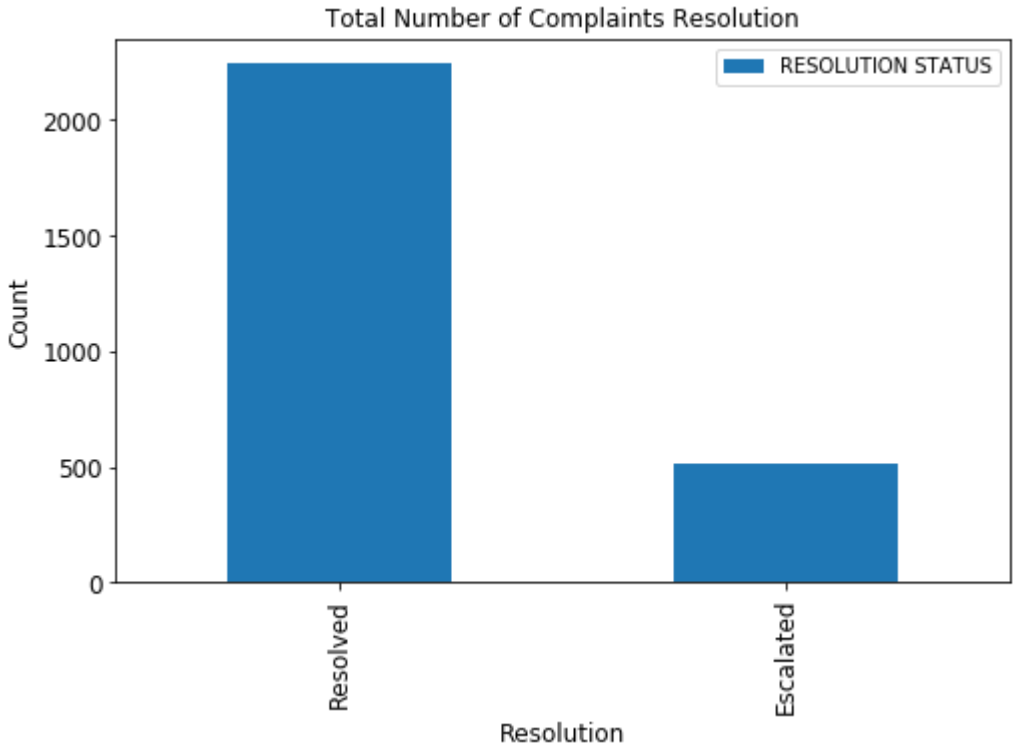
In [24]:
```
ax = df3.plot(kind='bar', title ="Total Number of Complaints per Decoder/Antenna type", figsize=(8, 5), legend=False, fontsize=12)
ax.set_ylabel("Count", fontsize=12)
plt.show()
```



In [25]:
```
df4 = df2.groupby(["DECODER TYPE", "ANTENNAE TYPE"])["COMPLAINT CATEGORY"].count()
df4
```

Out[25]:
```
DECODER TYPE                            ANTENNAE TYPE
DIGITAL TERRESTIAL TRANSMISSION (DTT)   ANTENNAE (EXTERNAL)    2192
                                        ANTENNAE (INTERNAL)     125
DIRECT TO HOME (DTH)                    ANTENNAE (EXTERNAL)     199
                                        ANTENNAE (INTERNAL)       2
Name: COMPLAINT CATEGORY, dtype: int64
```

In [26]:
```
resolution = df2['RESOLUTION STATUS'].value_counts()
ax = resolution.plot(kind='bar', title ="Total Number of Complaints Resolutio
n", figsize=(8, 5), legend=True, fontsize=12)
ax.set_xlabel("Resolution", fontsize=12)
ax.set_ylabel("Count", fontsize=12)
plt.show()
```

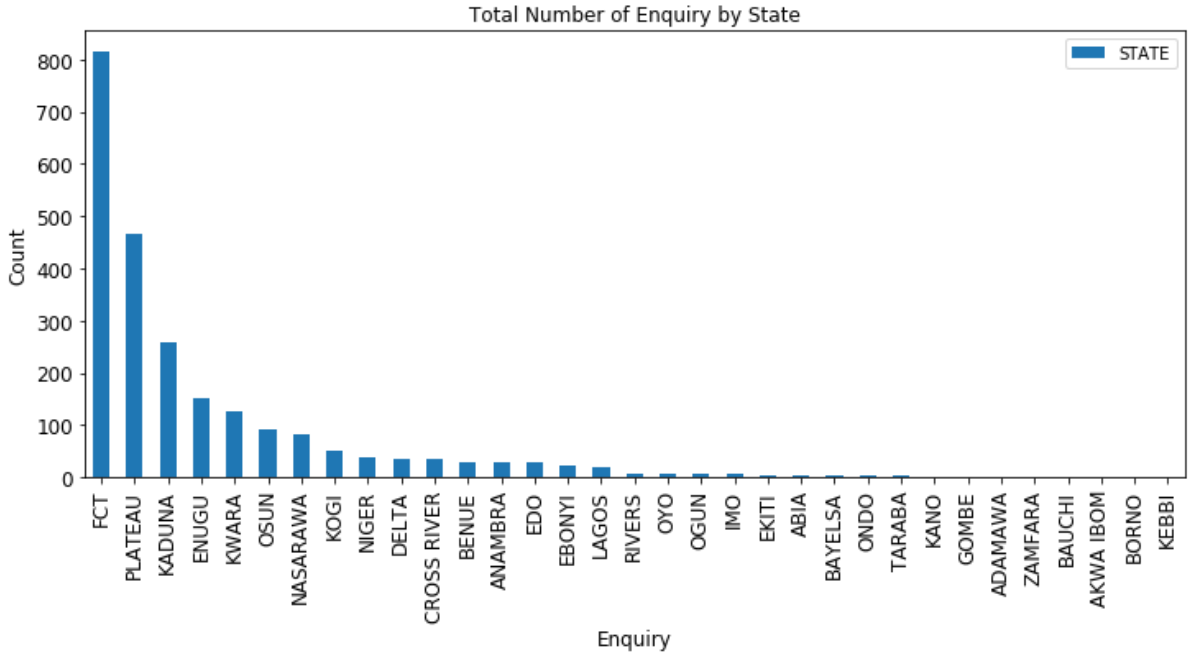


In [27]:
```
df5 = df1[df1['CALL CATEGORY'] =='Enquiry']
df5.head()
```

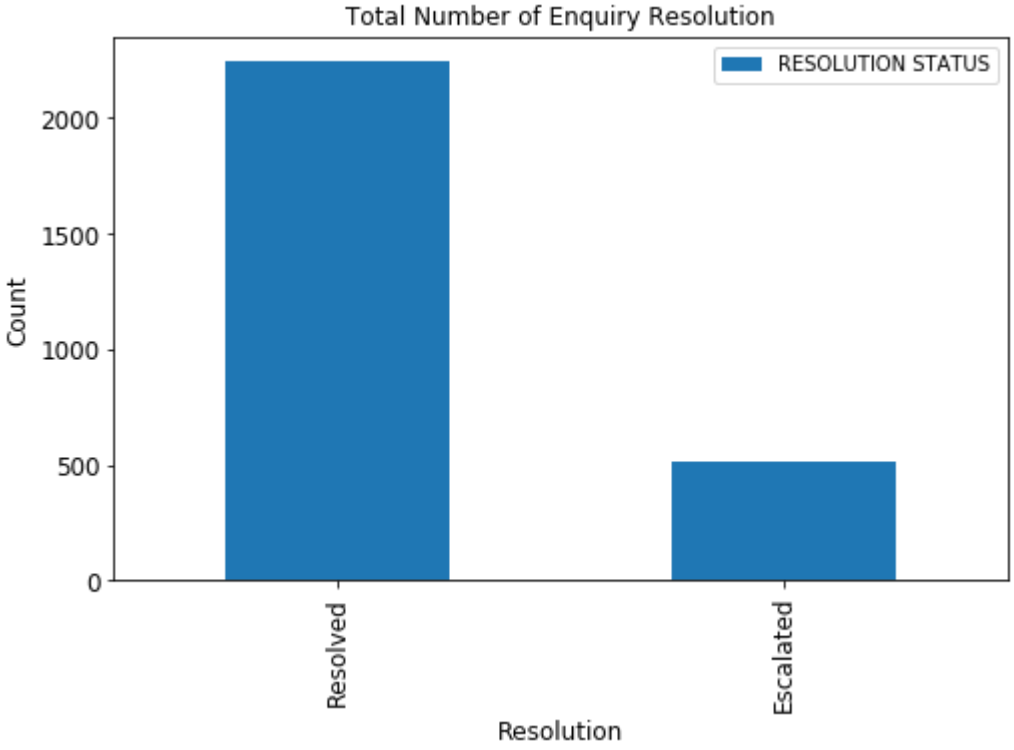
Out[27]:

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	DEC
3	2020-10-01 02:30:10	MR NDUBUSI	MALE	7051888653	PORT HARCOURT	RIVERS	RIVERS	
4	2020-10-01 02:31:49	MR SUNDAY	MALE	7083502865	NaN	NaN	NaN	D TERRE TRANSMI
12	2020-10-01 02:50:29	MR JOE	MALE	8069279772	MANDALA	NaN	NIGER	D TERRE TRANSMI
27	2020-10-01 03:32:38	MR IBASS	MALE	8065666431	BWARI	FCT	FCT	D TERRE TRANSMI
104	2020-10-01 06:53:11	MR JOHN	MALE	8067996760	MASAKA	NASARAWA	NASARAWA	D TERRE TRANSMI

In [28]:
```
enquiry = df5['STATE'].value_counts()
ax = enquiry.plot(kind='bar', title ="Total Number of Enquiry by State", figsi
ze=(12, 5), legend=True, fontsize=12)
ax.set_xlabel("Enquiry", fontsize=12)
ax.set_ylabel("Count", fontsize=12)
plt.show()
```



In [29]:
```
enquiry_resolution = df5['RESOLUTION STATUS'].value_counts()
ax = resolution.plot(kind='bar', title ="Total Number of Enquiry Resolution",
figsize=(8, 5), legend=True, fontsize=12)
ax.set_xlabel("Resolution", fontsize=12)
ax.set_ylabel("Count", fontsize=12)
plt.show()
```



In [30]:
```
from datetime import datetime

def ___convert_to_datetime(d):
  return datetime.strptime(np.datetime_as_string(d,unit='s'), '%Y-%m-%dT%H:%
M:%S')

df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 28025 entries, 0 to 28024
Data columns (total 14 columns):
ENTRY DATE            28025 non-null datetime64[ns]
NAMES                 26619 non-null object
GENDER                26743 non-null object
MOBILE NUMBER         28025 non-null object
CUSTOMER ADDRESS      25352 non-null object
DSO REGION            24918 non-null object
STATE                 25312 non-null object
DECODER TYPE          19916 non-null object
ANTENNAE TYPE         20397 non-null object
BRAND OF BOX          19345 non-null object
CALL CATEGORY         28025 non-null object
COMPLAINT CATEGORY    18855 non-null object
AGENT NOTES           27995 non-null object
RESOLUTION STATUS     28025 non-null object
dtypes: datetime64[ns](1), object(13)
memory usage: 3.0+ MB
```

In [53]:
```
import datetime

# obtain datetime series:
datetimes = pd.to_datetime(df2['ENTRY DATE'])

# assign your new columns
df1['hour'] = datetimes.dt.hour
df1['time'] = datetimes.dt.time
df1
```

```
C:\Users\Didi\Anaconda3\lib\site-packages\ipykernel_launcher.py:7: SettingWit
hCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/st
able/indexing.html#indexing-view-versus-copy
  import sys
C:\Users\Didi\Anaconda3\lib\site-packages\ipykernel_launcher.py:8: SettingWit
hCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/st
able/indexing.html#indexing-view-versus-copy
```

Out[53]:

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	
1	2020-10-01 02:27:12	MR KINGSLEY	MALE	8069454349	MARARABA	NaN	NASARAWA	T
3	2020-10-01 02:30:10	MR NDUBUSI	MALE	7051888653	PORT HARCOURT	RIVERS	RIVERS	
4	2020-10-01 02:31:49	MR SUNDAY	MALE	7083502865	NaN	NaN	NaN	T
5	2020-10-01 02:34:38	MR DAVID	MALE	8166024443	JOS SOUTH	PLATEAU	PLATEAU	T
6	2020-10-01 02:37:12	MR WILLIAMS	MALE	8086636304	KADUNA CENTRAL	NaN	NaN	T
7	2020-10-01 02:38:53	MR CHIDEX	MALE	9015054641	GWAGWALADA	FCT	FCT	T
8	2020-10-01 02:41:05	MR TIMOTHY	MALE	7037177817	JOS NORTH	PLATEAU	PLATEAU	T
9	2020-10-01 02:43:14	MR CHIDEX	MALE	9015054641	GWAGWALADA	FCT	FCT	T
10	2020-10-01 02:45:03	MR CHIDEX	MALE	9015054641	GWAGWALADA	NaN	FCT	T
11	2020-10-01 02:47:15	MR UMAR	MALE	8075576061	KADUNA SOUTH	NaN	KADUNA	T
12	2020-10-01 02:50:29	MR JOE	MALE	8069279772	MANDALA	NaN	NIGER	T

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	
14	2020-10-01 02:53:36	MR HANSON	MALE	8133879582	AIRPORT RD	FCT	FCT	T
15	2020-10-01 02:59:10	MR ABDULAHI	MALE	8139610014	JOS NORTH	PLATEAU	PLATEAU	T
16	2020-10-01 03:01:10	MR JEFFERY	MALE	7036899138	JOS NORTH	PLATEAU	PLATEAU	T
18	2020-10-01 03:11:20	MR ETAL	MALE	8065666431	BWARI	FCT	FCT	T
19	2020-10-01 03:14:08	MR BEN	MALE	8164944093	JOS NORTH	NaN	PLATEAU	T
20	2020-10-01 03:19:32	MR CHIBUZOR	MALE	7041692368	LUGBE	FCT	FCT	T
24	2020-10-01 03:24:27	MR DAUDA	MALE	8026064794	ASOKORO	FCT	FCT	T
25	2020-10-01 03:28:35	MR CHARLEY	MALE	8033509169	LIFE CAMP	FCT	FCT	T
26	2020-10-01 03:29:10	MR ISAAC	MALE	8065666431	apo	FCT	FCT	
27	2020-10-01 03:32:38	MR IBASS	MALE	8065666431	BWARI	FCT	FCT	T
28	2020-10-01 03:34:47	MR VINCENT	MALE	8032050204	APO	FCT	FCT	
29	2020-10-01 03:35:45	MR MOSES	MALE	7033804197	KADO	FCT	FCT	T

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	
30	2020-10-01 03:39:44	MR DAVID	MALE	7087816733	ZUBA	FCT	FCT	T
32	2020-10-01 03:43:54	MR YAKUBU	MALE	8061271810	BURI	FCT	FCT	
33	2020-10-01 03:45:00	MR MOSES	MALE	7033804197	LIFE CAMP	FCT	FCT	T
34	2020-10-01 03:47:41	MR GEBRIEL	MALE	8031949346	APO	FCT	FCT	
35	2020-10-01 03:49:42	MR MONDAY	MALE	8165213216	JOS SOUTH	PLATEAU	PLATEAU	T
36	2020-10-01 03:53:15	MR GABRIEL	MALE	8031949346	MARARABA	NASARAWA	NASARAWA	T
37	2020-10-01 03:55:29	MR CHIBUZOR	MALE	9096239417	APO	FCT	FCT	
...	...	...	...	...	...	...	...	
27991	2020-06-29 10:22:08	MR MUSA	MALE	8039200607	KADUNA SOUTH	KADUNA	KADUNA	T
27992	2020-06-29 10:22:28	EMMANUEL	MALE	8131378758	KABA	KOGI	KOGI	
27993	2020-06-29 10:25:01	MOHHAMED	MALE	8068462616	ILLORIN	KWARA	KWARA	T
27994	2020-06-29 10:26:12	MRS KATE	MALE	8036949790	GWAGWALADA	FCT	FCT	T
27995	2020-06-29 10:27:25	MR EMMANUEL	MALE	9091186600	KADUNA NORTH	KADUNA	KADUNA	

	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	
27997	2020-06-29 10:41:37	MR STEPHEN	MALE	7032363766	LUGBE	FCT	FCT	T
27999	2020-06-29 10:45:04	MR EMEKA	MALE	7065751719	JOS NORTH	PLATEAU	PLATEAU	T
28001	2020-06-29 10:49:09	wasiu	MALE	7062504343	OSHOGBO	OSUN	OSUN	T
28002	2020-06-29 10:49:25	MR JOHN	MALE	8127201839	JOS NORTH	PLATEAU	PLATEAU	
28003	2020-06-29 10:51:40	TIMOTHY	MALE	9060769380	GWAGWA	FCT	FCT	
28004	2020-06-29 10:56:24	MR EMEKA	MALE	7065751719	APO	FCT	FCT	
28005	2020-06-29 10:56:55	TOLUWOLE	MALE	8128785788	DURUMI	FCT	FCT	T
28007	2020-06-29 11:08:14	MR SAMUEL	MALE	8052240882	GARKI 2	FCT	FCT	T
28008	2020-06-29 11:11:11	MR PRINCE	MALE	7040292926	JOS SOUTH	PLATEAU	PLATEAU	T
28009	2020-06-29 11:13:23	daniel	MALE	8061567138	GWAGWALADA	FCT	FCT	T
28010	2020-06-29 11:13:56	MR CHRISTAIN	MALE	9092007848	GWAGWALADA	FCT	FCT	T
28011	2020-06-29 11:18:18	STEVEN	MALE	8052240882	GARKI	FCT	FCT	T
28012	2020-06-29 11:23:18	MR AYUBA	MALE	8145209814	JOS SOUTH	PLATEAU	PLATEAU	T

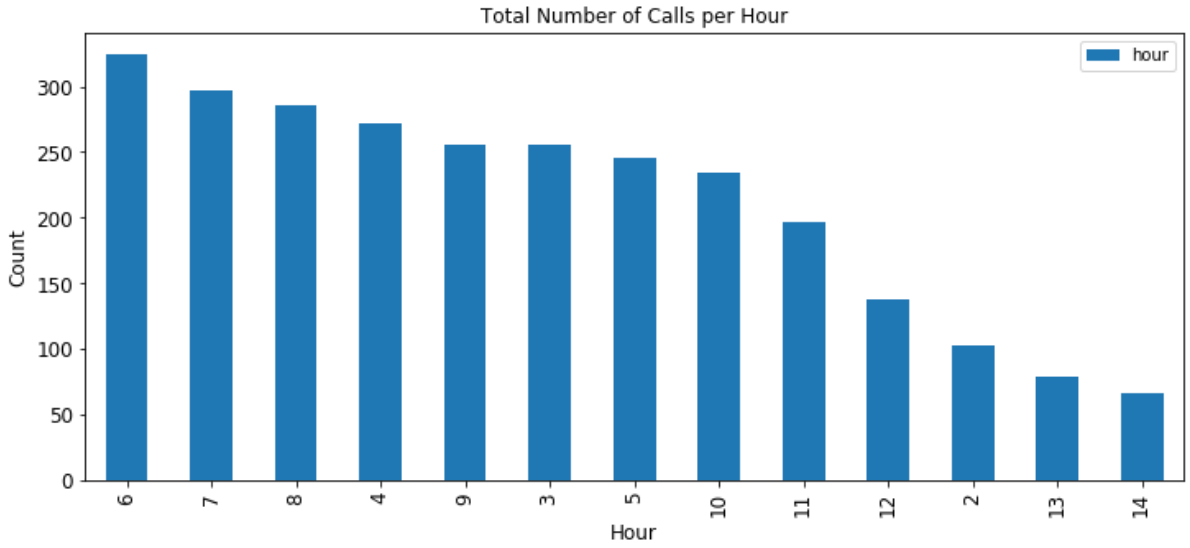
	ENTRY DATE	NAMES	GENDER	MOBILE NUMBER	CUSTOMER ADDRESS	DSO REGION	STATE	
28013	2020-06-29 11:25:00	PETER	MALE	8130783105	JOS NORTH	PLATEAU	PLATEAU	T
28014	2020-06-29 11:27:06	MR EMMANUEL	MALE	8037006900	LOKOGOMA	FCT	FCT	T
28015	2020-06-29 11:29:53	MR NKEM	MALE	8076218135	GWAGWALADA	FCT	FCT	T
28016	2020-06-29 11:32:46	MR EMMANUEL	MALE	8168472096	BWARI	FCT	FCT	T
28017	2020-06-29 11:36:41	MRS CHIYERE	FEMALE	9062135433	AIRPORT ROAD	FCT	FCT	T
28018	2020-06-29 12:09:46	MR JEFFERY	MALE	8104058782	JOS NORTH	PLATEAU	PLATEAU	
28019	2020-06-29 12:10:06	john	MALE	8127201839	KADUNA SOUTH	KADUNA	KADUNA	T
28020	2020-06-29 12:25:11	ADERONKE	FEMALE	7065592576	LUGBE	FCT	FCT	T
28021	2020-06-29 12:56:43	ADERONKE	FEMALE	7065592576	LUGBE	FCT	FCT	T
28022	2020-06-29 13:10:21	MR JAMES	MALE	7039050409	JOS NORTH	PLATEAU	PLATEAU	
28023	2020-06-29 13:13:36	MR JOSHUA	MALE	8065094499	AIRPORT	FCT	FCT	
28024	2020-06-29 13:17:07	MR JOHN	MALE	8033176714	APO	FCT	FCT	

23382 rows × 16 columns

In [48]:
```
hour_count = df2['hour'].value_counts()
hour_count
```

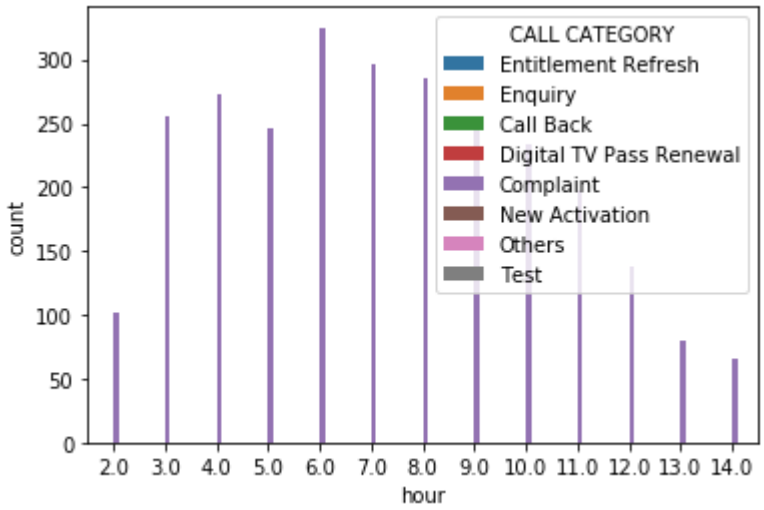
Out[48]:
```
6     325
7     297
8     286
4     272
9     255
3     255
5     246
10    234
11    197
12    138
2     102
13     79
14     66
Name: hour, dtype: int64
```

In [49]:
```
ax = hour_count.plot(kind='bar', title ="Total Number of Calls per Hour", figsize=(12, 5), legend=True, fontsize=12)
ax.set_xlabel("Hour", fontsize=12)
ax.set_ylabel("Count", fontsize=12)
plt.show()
```



In [54]:
```
import seaborn as sns
sns.countplot(data=df1,x='hour',hue='CALL CATEGORY')
```

Out[54]: <matplotlib.axes._subplots.AxesSubplot at 0x1f4b4e78b00>



In [ ]: